

CLAIMS

1. A foamed laminate based on olefin in which
a substrate layer, consisting of a foamed body
(X_r) of an olefinic thermoplastic elastomer (X), and
a skin layer made of the resin or the
thermoplastic elastomer composition given below
are laminated:

Y: an ultrahigh molecular weight polyolefin
resin having an intrinsic viscosity (η) of 3.5 - 8.3
dl/g as determined in decalin at 135 °C

Z: an olefinic thermoplastic elastomer
composition comprising an olefinic thermoplastic
elastomer (C) and a lubricant (Z_L).

2. A foamed laminate based on olefin in which
a substrate layer, consisting of a foamed body
(X_r) of an olefinic thermoplastic elastomer (X), and
a skin layer made of the resin or the
thermoplastic elastomer composition given below
are laminated:

Y: an ultrahigh molecular weight polyolefin
resin having an intrinsic viscosity (η) of 3.5 - 8.3
dl/g as determined in decalin at 135 °C

Z: an olefinic thermoplastic elastomer
composition which comprises, per 100 parts by weight of
an olefinic thermoplastic elastomer (C), at least one
kind of lubricant (Z_L) selected from the group
consisting of 0.5 - 25 parts by weight of an
organopolysiloxane (D), 0.5 - 10 parts by weight of a
fluorine-containing polymer (E), 0.5 - 10 parts by

weight of an antistatic agent (F), 5 - 200 parts by weight of a polyolefin resin (G), 0.01 - 5 parts by weight of a fatty acid amide, 0.5 - 10 parts by weight of a mineral oil, 0.01 - 5 parts by weight of a metal soap, 0.01 - 5 parts by weight of an ester, 0.01 - 5 parts by weight of calcium carbonate and 0.01 - 5 parts by weight of a silicate, each in a proportion as given above.

3. The foamed laminate as claimed in claim 1 or 2, wherein the olefinic thermoplastic elastomer (X) is one which has a compression set of 60 % or less, as determined according to JIS K 6262 (70 °C, 22 hours), and a melt flow rate of 0.1 g/10 min. or higher, as determined according to JIS K 7120 (230 °C, 10 kg load).

4. A foamed laminate based on olefin in which
a substrate layer, consisting of a foamed body (X_f) of an ethylenic thermoplastic elastomer (A) comprising 5 - 60 parts by weight of a polyethylene resin (a-1) and 40 - 95 parts by weight of a copolymer based on ethylene/ α -olefin (a-2), with the said constituents (a-1) and (a-2) summing up to 100 parts by weight, and

a skin layer made of an ultrahigh molecular weight polyolefin resin (Y)
are laminated,

wherein the said copolymer based on ethylene/ α -olefin (a-2) is a copolymer of ethylene, an α -olefin and, optionally incorporated, non-conjugated polyene and has a Mooney viscosity $ML_{1+4}(100\text{ }^{\circ}\text{C})$ of 90 - 250 and an ethylene content of 70 - 95 mole % and

wherein the said ultrahigh molecular weight polyolefin resin (Y) is one which has an intrinsic viscosity (η) of 3.5 - 8.3 dl/g as determined in decalin at 135 °C.

5. A foamed laminate based on olefin in which

a substrate layer, consisting of a foamed body (X_{F1}) of an ethylenic thermoplastic elastomer (A) comprising 5 - 60 parts by weight of a polyethylene resin (a-1) and 40 - 95 parts by weight of a copolymer based on ethylene/ α -olefin (a-2), with the said constituents (a-1) and (a-2) summing up to 100 parts by weight, and

a skin layer made of an olefinic thermoplastic elastomer composition (Z)

are laminated,

wherein the said copolymer based on ethylene/ α -olefin (a-2) is a copolymer of ethylene, an α -olefin and, optionally incorporated, non-conjugated polyene and has a Mooney viscosity $ML_{1+4}(100\text{ }^{\circ}\text{C})$ of 90 - 250 and an ethylene content of 70 - 95 mole % and

wherein the said olefinic thermoplastic elastomer composition (Z) is one which comprises, per 100 parts by weight of an olefinic thermoplastic elastomer (C), at least one kind of lubricant (Z_L) selected from the group consisting of 0.5 - 25 parts by weight of an organopolysiloxane (D), 0.5 - 10 parts by weight of a fluorine-containing polymer (E), 0.5 - 10 parts by weight of an antistatic agent (F), 5 - 200 parts by weight of a polyolefin resin (G), 0.01 - 5 parts by weight of a fatty acid amide, 0.5 - 10 parts

by weight of a mineral oil, 0.01 - 5 parts by weight of a metal soap, 0.01 - 5 parts by weight of an ester, 0.01 - 5 parts by weight of calcium carbonate and 0.01 - 5 parts by weight of a silicate, each in a proportion as given above.

6. A foamed laminate based on olefin in which

a substrate layer, consisting of a foamed body (X_{r1}) of an ethylenic thermoplastic elastomer (A) comprising 5 - 60 parts by weight of a polyethylene resin (a-1) and 40 - 95 parts by weight of a copolymer based on ethylene/ α -olefin (a-2), with the said constituents (a-1) and (a-2) summing up to 100 parts by weight, and

a skin layer made of an olefinic thermoplastic elastomer composition (Z_1)

are laminated,

wherein the said copolymer based on ethylene/ α -olefin (a-2) is a copolymer of ethylene, an α -olefin and, optionally incorporated, non-conjugated polyene and has a Mooney viscosity $ML_{1+4}(100^\circ C)$ of 90 - 250 and an ethylene content of 70 - 95 mole % and

wherein the said olefinic thermoplastic elastomer composition (Z_1) is one which comprises, per 100 parts by weight of an olefinic thermoplastic elastomer (C), at least one kind selected from the group consisting of 0.5 - 25 parts by weight of an organopolysiloxane (D), 0.5 - 10 parts by weight of a fluorine-containing polymer (E) and 0.5 - 10 parts by weight of an antistatic agent (F), each in a proportion as given above.

7. A foamed laminate based on olefin in which
- a substrate layer, consisting of a foamed body (X_{f1}) of an ethylenic thermoplastic elastomer (A) comprising 5 - 60 parts by weight of a polyethylene resin (a-1) and 40 - 95 parts by weight of a copolymer based on ethylene/ α -olefin (a-2), with the said constituents (a-1) and (a-2) summing up to 100 parts by weight, and
- a skin layer made of an olefinic thermoplastic elastomer composition (Z_2)

are laminated,

wherein the said copolymer based on ethylene/ α -olefin (a-2) is a copolymer of ethylene, an α -olefin and, optionally incorporated, non-conjugated polyene and has a Mooney viscosity $ML_{1+4}(100^\circ C)$ of 90 - 250 and an ethylene content of 70 - 95 mole % and

wherein the said olefinic thermoplastic elastomer composition (Z_2) is one which comprises, per 100 parts by weight of an olefinic thermoplastic elastomer (C), a polyolefin resin (G) in an amount of 5 - 200 parts by weight.

8. A foamed laminate based on olefin in which
- a substrate layer, consisting of a foamed body (X_{f1}) of an ethylenic thermoplastic elastomer (A) comprising 5 - 60 parts by weight of a polyethylene resin (a-1) and 40 - 95 parts by weight of a copolymer based on ethylene/ α -olefin (a-2), with the said constituents (a-1) and (a-2) summing up to 100 parts by weight, and
- a skin layer made of an olefinic thermoplastic

elastomer composition (Z_3)
are laminated,

wherein the said copolymer based on ethylene/ α -olefin (a-2) is a copolymer of ethylene, an α -olefin and, optionally incorporated, non-conjugated polyene and has a Mooney viscosity $ML_{1+1}(100^\circ C)$ of 90 - 250 and an ethylene content of 70 - 95 mole % and

wherein the said olefinic thermoplastic elastomer composition (Z_3) is one which comprises, per 100 parts by weight of an olefinic thermoplastic elastomer (C), at least one kind selected from the group consisting of 0.5 - 25 parts by weight of an organopolysiloxane (D), 0.5 - 10 parts by weight of a fluorine-containing polymer (E), 0.5 - 10 parts by weight of an antistatic agent (F), 0.01 - 5 parts by weight of a fatty acid amide, 0.5 - 10 parts by weight of a mineral oil, 0.01 - 5 parts by weight of a metal soap, 0.01 - 5 parts by weight of an ester, 0.01 - 5 parts by weight of calcium carbonate and 0.01 - 5 parts by weight of a silicate, each in a proportion given above, and which further comprises a polyolefin resin (G) in an amount of 5 - 200 parts by weight.

9. The foamed laminate based on olefin as claimed in any one of claims 5 to 8, wherein the olefinic thermoplastic elastomer (C) is one which is obtained by a dynamic heat treatment of a mixture comprising a crystalline polyolefin resin (c-1) and a rubber (c-2).

10. The foamed laminate based on olefin as claimed in claim 5, 7 or 8, wherein the polyolefin resin (G) is an ultrahigh molecular weight polyolefin resin (Y).

11. The foamed laminate based on olefin as claimed in claim 4, 5, 7, 8 or 10, wherein the ultrahigh molecular weight polyolefin resin (Y) comprises 15 - 40 parts by weight of an ultrahigh molecular weight polyolefin resin (y-1) having an intrinsic viscosity (η) of 10 - 40 dl/g as determined in decalin at 135 °C and 85 - 60 parts by weight of a polyolefin resin (y-2) having an intrinsic viscosity (η) of 0.1 - 5 dl/g as determined in decalin at 135 °C, with the said constituents (y-1) and (y-2) summing up to 100 parts by weight.

12. The foamed laminate based on olefin as claimed in any one of claims 4 to 11, wherein the ethylenic thermoplastic elastomer (A) comprises a polypropylene resin (a-3) in an amount of 30 parts by weight or less, per 100 parts by weight of total sum of the polyethylene resin (a-1) and the copolymer based on ethylene/ α -olefin (a-2).

13. The foamed laminate based on olefin as claimed in any one of claims 4 to 12, wherein the foaming expansion ratio of the foamed body (X_{F1}) is at least twofold.

14. The foamed laminate based on olefin as claimed in any one of claims 4 to 13, wherein the ethylenic thermoplastic elastomer (A) consists of a thermoplastic elastomer obtained by subjecting a mixture of the polyethylene resin (a-1) and the copolymer based on ethylene/ α -olefin (a-2) or a mixture which contains further, on requirement, the polypropylene resin (a-3) to a dynamic heat treatment in the absence of

cross-linking agent.

15. The foamed laminate based on olefin as claimed in any one of claims 5 to 14, wherein the olefinic thermoplastic elastomer (C) is one which is obtained by subjecting a mixture comprising the crystalline polyolefin resin (c-1) and the rubber (c-2) to a dynamic heat treatment in the presence of a cross-linking agent.

16. The foamed laminate based on olefin as claimed in any one of claims 4 to 15, wherein the formed body (X_{f1}) is one which is obtained by subjecting a foamable ethylenic thermoplastic elastomer composition (X_1) comprising the ethylenic thermoplastic elastomer (A) and the foaming agent (B) to foaming.

17. The foamed laminate based on olefin as claimed in claim 16, wherein the foaming agent (B) is an organic or inorganic foaming agent of a heat-decomposition type.

18. The foamed laminate based on olefin as claimed in claim 16 or 17, wherein the content of the foaming agent (B) is 0.5 - 20 parts by weight per 100 parts by weight of the ethylenic thermoplastic elastomer (A).

19. The foamed laminate based on olefin as claimed in any one of claims 4 to 18, wherein the ethylenic thermoplastic elastomer (A) is one which has a compression set of 60 % or less as determined according to JIS K 6262 (at 70 °C, 22 hours) and a melt flow rate of 0.1 g/10 min. or higher as determined according to JIS K 7120 (at 230 °C, 10 kg load).

20. A foamed laminate based on olefin in which

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a substrate layer, consisting of a foamed body (X_{r2}) made of an olefinic thermoplastic elastomer composition (X_2) comprising 100 parts by weight of an olefinic thermoplastic elastomer (J) and 1 - 20 parts by weight of an olefinic thermoplastic resin (K), and

a skin layer made of an ultrahigh molecular weight polyolefin resin (Y),

are laminated,

wherein the said olefinic thermoplastic elastomer (J) is one which is obtained by subjecting a mixture comprising 5 - 60 parts by weight of a polyolefin resin (j-1) and 40 - 95 parts by weight of an ethylene/ α -olefin copolymer rubber (j-2) resulting from copolymerization of ethylene, an α -olefin and, optionally incorporated, a non-conjugated polyene, with the said constituents (j-1) and (j-2) summing up to 100 parts by weight, to a dynamic heat treatment,

the said olefinic thermoplastic resin (K) is one which has an olefin content of 50 - 100 mole % and a melt flow rate (ASTM D-1238-65T, 230 °C, 2.16 kg load) of 0.01 - 2 g/10 min. and

the said ultrahigh molecular weight polyolefin resin (Y) is one which has an intrinsic viscosity (η) of 3.5 - 8.3 dl/g determined in decalin at 135 °C.

21. A foamed laminate based on olefin in which

a substrate layer, consisting of a foamed body (X_{r2}) made of an olefinic thermoplastic elastomer composition (X_2) comprising 100 parts by weight of an olefinic thermoplastic elastomer (J) and 1 - 20

parts by weight of an olefinic thermoplastic resin (K), and

a skin layer made of an olefinic thermoplastic elastomer composition (Z)

are laminated,

wherein the said olefinic thermoplastic elastomer (J) is one which is obtained by subjecting a mixture comprising 5 - 60 parts by weight of a polyolefin resin (j-1) and 40 - 95 parts by weight of an ethylene/ α -olefin copolymer rubber (j-2) resulting from copolymerization of ethylene, an α -olefin and, optionally incorporated, a non-conjugated polyene, with the said constituents (j-1) and (j-2) summing up to 100 parts by weight, to a dynamic heat treatment,

the said olefinic thermoplastic resin (K) is one which has an olefin content of 50 - 100 mole % and a melt flow rate (ASTM D-1238-65T, 230 °C, 2.16 kg load) of 0.01 - 2 g/10 min. and

the said olefinic thermoplastic elastomer composition (Z) is one which comprises, per 100 parts by weight of an olefinic thermoplastic elastomer (C), at least one kind of lubricant (Z_L) selected from the group consisting of 0.5 - 25 parts by weight of an organopolysiloxane (D), 0.5 - 10 parts by weight of a fluorine-containing polymer (E), 0.5 - 10 parts by weight of an antistatic agent (F), 5 - 200 parts by weight of a polyolefin resin (G), 0.01 - 5 parts by weight of a fatty acid amide, 0.5 - 10 parts by weight of a mineral oil, 0.01 - 5 parts by weight of a metal soap, 0.01 - 5 parts by weight of an ester, 0.01 - 5

parts by weight of calcium carbonate and 0.01 - 5 parts by weight of a silicate, each in a proportion as given above.

22. A foamed laminate based on olefin in which

a substrate layer, consisting of a foamed body (X_{F2}) made of an olefinic thermoplastic elastomer composition (X_2) comprising 100 parts by weight of an olefinic thermoplastic elastomer (J) and 1 - 20 parts by weight of an olefinic thermoplastic resin (K) and

a skin layer made of an olefinic thermoplastic elastomer composition (Z_1)

are laminated,

wherein the said olefinic thermoplastic elastomer (J) is one which is obtained by subjecting a mixture comprising 5 - 60 parts by weight of a polyolefin resin (j-1) and 40 - 95 parts by weight of an ethylene/ α -olefin copolymer rubber (j-2) resulting from copolymerization of ethylene, an α -olefin and, optionally incorporated, a non-conjugated polyene, with the said constituents (j-1) and (j-2) summing up to 100 parts by weight, to a dynamic heat treatment,

the said olefinic thermoplastic resin (K) is one which has an olefin content of 50 - 100 mole % and a melt flow rate (ASTM D-1238-65T, 230 °C, 2.16 kg load) of 0.01 - 2 g/10 min. and

the said olefinic thermoplastic elastomer composition (Z_1) is one which comprises, per 100 parts by weight of an olefinic thermoplastic elastomer (C), at least one kind selected from the group consisting of

0.5 - 25 parts by weight of an organopolysiloxane (D),
0.5 - 10 parts by weight of a fluorine-containing
polymer (E) and 0.5 - 10 parts by weight of an
antistatic agent (F), each in a proportion as given
above.

23. A foamed laminate based on olefin in which

a substrate layer, consisting of a foamed body
(X_{F2}) made of an olefinic thermoplastic elastomer
composition (X_2) comprising 100 parts by weight of
an olefinic thermoplastic elastomer (J) and 1 - 20
parts by weight of an olefinic thermoplastic resin
(K), and

a skin layer made of an olefinic thermoplastic
elastomer composition (Z_2)

are laminated,

wherein the said olefinic thermoplastic
elastomer (J) is one which is obtained by subjecting a
mixture comprising 5 - 60 parts by weight of a
polyolefin resin (j-1) and 40 - 95 parts by weight of
an ethylene/ α -olefin copolymer rubber (j-2) resulting
from copolymerization of ethylene, an α -olefin and,
optionally incorporated, a non-conjugated polyene, with
the said constituents (j-1) and (j-2) summing up to 100
parts by weight, to a dynamic heat treatment,

the said olefinic thermoplastic resin (K) is
one which has an olefin content of 50 - 100 mole % and
a melt flow rate (ASTM D-1238-65T, 230 °C, 2.16 kg
load) of 0.01 - 2 g/10 min. and

the said olefinic thermoplastic elastomer
composition (Z_2) is one which comprises, per 100 parts

by weight of an olefinic thermoplastic elastomer (C), a polyolefin resin (G) in an amount of 5 - 200 parts by weight.

24. A foamed laminate based on olefin in which
a substrate layer, consisting of a foamed body (X_2) made of an olefinic thermoplastic elastomer composition (X_2) comprising 100 parts by weight of an olefinic thermoplastic elastomer (J) and 1 - 20 parts by weight of an olefinic thermoplastic resin (K), and

a skin layer made of an olefinic thermoplastic elastomer composition (Z_2)
are laminated,

wherein the said olefinic thermoplastic elastomer (J) is one which is obtained by subjecting a mixture comprising 5 - 60 parts by weight of a polyolefin resin (j-1) and 40 - 95 parts by weight of an ethylene/ α -olefin copolymer rubber (j-2) resulting from copolymerization of ethylene, an α -olefin and, optionally incorporated, a non-conjugated polyene, with the said constituents (j-1) and (j-2) summing up to 100 parts by weight, to a dynamic heat treatment,

the said olefinic thermoplastic resin (K) is one which has an olefin content of 50 - 100 mole % and a melt flow rate (ASTM D-1238-65T, 230 °C, 2.16 kg load) of 0.01 - 2 g/10 min. and

wherein the said olefinic thermoplastic elastomer composition (Z_2) is one which comprises, per 100 parts by weight of an olefinic thermoplastic elastomer (C), at least one kind selected from the

group consisting of 0.5 - 25 parts by weight of an organopolysiloxane (D), 0.5 - 10 parts by weight of a fluorine-containing polymer (E), 0.5 - 10 parts by weight of an antistatic agent (F), 0.01 - 5 parts by weight of a fatty acid amide, 0.5 - 10 parts by weight of a mineral oil, 0.01 - 5 parts by weight of a metal soap, 0.01 - 5 parts by weight of an ester, 0.01 - 5 parts by weight of calcium carbonate and 0.01 - 5 parts by weight of a silicate, each in a proportion given above, and further comprises a polyolefin resin (G) in an amount of 5 - 200 parts by weight.

25. The foamed laminate based on olefin, as claimed in any one of claims 21 to 24, wherein the olefinic thermoplastic elastomer (C) is one which is obtained by a dynamic heat treatment of a mixture comprising a crystalline polyolefin resin (c-1) and a rubber (c-2).

26. The foamed laminate based on olefin, as claimed in claim 21, 23 or 24, wherein the polyolefin resin (G) is an ultrahigh molecular weight polyolefin resin (Y).

27. The formed laminate based on olefin, as claimed in claim 20, 21, 23, 24 or 26, wherein the ultrahigh molecular weight polyolefin resin (Y) comprises 15 - 40 parts by weight of an ultrahigh molecular weight polyolefin resin (y-1) having an intrinsic viscosity (η) of 10 - 40 dl/g as determined in decalin at 135 °C and 85 - 60 parts by weight of a polyolefin resin (y-2) having an intrinsic viscosity (η) of 0.1 - 5 dl/g as determined in decalin at 135 °C, with the said constituents (y-1) and (y-2) summing up to 100 parts by weight.

28. The foamed laminate based on olefin, as claimed in any one of claims 20 to 27, wherein the polyolefin resin (j-1) of the olefinic thermoplastic elastomer (J) is a polypropylene resin.

29. The foamed laminate based on olefin, as claimed in any one of claims 20 to 28, wherein the olefinic thermoplastic elastomer (J) comprises further 10 - 200 parts by weight of a softening agent (j-3) per 100 parts by weight of the ethylene/ α -olefin copolymer rubber (j-2).

30. The foamed laminate based on olefin, as claimed in any one of claims 20 to 29, wherein the olefinic thermoplastic elastomer (J) is a thermoplastic elastomer composition obtained by subjecting a mixture comprising the polyolefin resin (j-1) and the ethylene/ α -olefin copolymer rubber (j-2) or a mixture which comprises further, optionally incorporated, the softening agent (j-3) to a dynamic heat treatment in the presence of a cross-linking agent.

31. The foamed laminate based on olefin, as claimed in any one of claims 20 to 30, wherein the olefinic thermoplastic resin (K) is an isotactic polypropylene or a propylene/ α -olefin copolymer.

32. The foamed laminate based on olefin, as claimed in any one of claims 20 to 31, wherein the foamed body (X_{F2}) is one which is obtained by foaming a foamable composition based on olefin (X_1) comprising 100 parts by weight of the olefinic thermoplastic elastomer (J), 1 - 20 parts by weight of the olefinic thermoplastic resin (K) and the forming agent (B).

33. The foamed laminate based on olefin, as claimed in claim 32, wherein the foaming agent (B) is an organic or an inorganic foaming agent of heat-decomposition type.

34. The foamed laminate based on olefin, as claimed in claim 32 or 33, wherein the content of the foaming agent (B) is in the range of 0.5 - 20 parts by weight per 100 parts by weight of total sum of the olefinic thermoplastic elastomer (J) and the olefinic thermoplastic resin (K).

35. The foamed laminate based on olefin, as claimed in any one of claims 20 to 34, wherein the foaming expansion ratio of the foamed body ($X_{r,2}$) is at least twofold.

36. The foamed laminate based on olefin, as claimed in any one of claims 21 to 35, wherein the olefinic thermoplastic elastomer (C) is one which is obtained by subjecting a mixture comprising the crystalline polyolefin resin (c-1) and the rubber (c-2) to a dynamic heat treatment in the presence of a cross-linking agent.

37. The foamed laminate based on olefin, as claimed in any one of claims 20 to 36, wherein the olefinic thermoplastic elastomer composition (X_2) is one which has a compression set of 60 % or less as determined according to JIS K 6262 (70 °C, 22 hours) and a melt flow rate of 0.1 g/10 min. or higher as determined according to JIS K 7120 (230 °C, 10 kg load).

38. A sliding element made of the foamed laminate based on olefin as claimed in any one of claims 1 to 37.

39. A weather strip for automobile made of the

foamed laminate based on olefin as claimed in any one of claims 1 to 37.

40. A sealing material for architectural use made of the foamed laminate based on olefin as claimed in any one of claims 1 to 37.